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Education

University of California at Berkeley, Economics Department
Ph.D. 1993; M.A. 1989
Dissertation: "Transfer Pricing and the Organization of Intrafirm Exchange."

University of California at Berkeley, School of Law (Boalt Hall)
J.D. 1992; Order of the Coif
Senior Articles Editor, *California Law Review*

Haverford College, Pennsylvania
B.A. (history) with high honors, 1986
Phi Beta Kappa; varsity track and cross country

Current Position

University of California at Berkeley, School of Law
Acting Professor of Law.

Experience

Federal Communications Commission, Washington, D.C.
Chief Economist. 1999-2000.

President's Council of Economic Advisers, Washington, D.C.
Senior Economist, responsible for issues of industrial organization, competition policy, regulation, and trade, 1998-99.

Kellogg, Huber, Hansen, Todd & Evans, Washington, D.C.
Associate, telecommunications and general litigation practice, 1995-97.

Law Clerk to Justice Antonin Scalia, United States Supreme Court, 1994–95.

Law Clerk to Judge Louis H. Pollak, U.S. District Court, Eastern District of Pennsylvania, 1993-94.

Law Clerk to Judge Stephen F. Williams, United States Court of Appeals, D.C. Circuit, 1992-93.

Other

Speak French and Spanish;
Enjoy brewing beer, outdoor sports, and travel;
Admitted to the Bar in the District of Columbia and Pennsylvania.

Research & Publications

"Robinson-Patman Act Regulation of Intraenterprise Pricing," (comment), 80 *California Law Review* 247 (1992).

(With Peter Klein) "Empirical Research in Transaction Cost Economics: A Review and Assessment," 11 *Journal of Law, Economics, & Organization* 335 (1995).

"Transaction-Level Determinants of Transfer Pricing Policy: Evidence From the High Technology Sector," working paper, U.C. Berkeley School of Law, September 1997.

"The Bending Line Between Conventional Broadcast and Wireless Carriage," 97 *Columbia Law Review* 1048 (1997).

"Video Competition and the Public Interest Debate," Mackie-Mason and Waterman (eds.), Telephony, the Internet, and the Media: Selected Papers from the 25th Annual Telecommunications Policy Research Conference (1998).

(With Peter Huber) "Administrative Creation of Property Rights to Radio Spectrum," XLI(2) *Journal of Law and Economics* 581 (October 1998).

(With Jerry Hausman) "Economic Welfare and Telecommunications Regulation: The E-Rate Policy for Universal-Service Subsidies," 16 *Yale J. Reg.* 19 (1999).

"The Speed Gap: Broadband Infrastructure and Electronic Commerce," 14 *Berkeley Tech. L. J.* 721 (1999).

"A Comment on Competition and Controversy in Local Telecommunications," 50 *Hastings L. J.* 1617 (2000).

"Competition and Deployment of New Technology in U.S. Telecommunications," 2000 *The U. Chicago Legal Forum* 85 (2000).

(With Greg Sidak) "Antitrust Divestiture in Network Industries," 68 *U. Chicago L. Rev.* 1 (winter 2001).

(With Stuart Benjamin and Douglas Lichtman) Telecommunications Law and Policy, Carolina Academic Press (2001).

Dr. Kenneth Gordon
Economic Foundations

Before the
FEDERAL COMMUNICATIONS COMMISSION
Washington, D.C. 20554

In the Matter of Petition of WorldCom, Inc. Pursuant to Section 252(e)(5) of the Communications Act for Expedited Preemption of the Jurisdiction of the Virginia State Corporation Commission Regarding Interconnection Disputes with Verizon Virginia Inc., and for Expedited Arbitration	)	CC Docket No. 00-218
In the Matter of Petition of Cox Virginia Telecom, Inc., etc.	)	CC Docket No. 00-249
In the Matter of Petition of AT&T Communications of Virginia Inc., etc.	)	CC Docket No. 00-251

VERIZON VIRGINIA INC.

Testimony of Dr. Kenneth Gordon

July 31, 2001

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I. BACKGROUND AND PURPOSE (JDPL Issues II-1-a TO II-1-c; II-2-a to II-2-c)

Q. Please state your name and current business address.

A. My name is Kenneth Gordon. I am a Special Consultant of National Economic Research Associates, Inc. (NERA). Previously, I was a Senior Vice President at NERA. My business address is One Main Street, Cambridge, Massachusetts 02142. My C.V. is provided as Attachment A.

Q. Please summarize your education and professional qualifications.

A. I am an economist and former Chairman of the Maine Public Utilities Commission ("Maine Commission") and of the Massachusetts Department of Public Utilities ("Mass. DPU"). The Mass. DPU is now known as the Massachusetts Department of Telecommunications and Energy.

I have been an economist since 1965, and I have been directly involved with developing and establishing regulatory policy at the federal and state levels since 1980, when I became an industry economist at the Federal Communications Commission (FCC).

I received my A.B. degree from Dartmouth College in 1960. I received my M.A. degree in 1963 and my Ph.D degree in 1973, both in economics, from the University of Chicago. I have taught applied microeconomics, industrial organization, and regulation (as well as other subjects) at Georgetown University, Northwestern University, University of Massachusetts at Amherst, and Smith College.

From 1980 to 1988, I was an industry economist at the FCC's Office of Plans and Policy, where I worked on a full range of regulatory issues, including

telecommunications, cable, broadcast, and intellectual property rights. At the FCC, one of the major focuses of my work was activity aimed at introducing competition into communications markets.

Prior to joining NERA in November 1995, I chaired the Maine Commission (1988 to December 1992) and the Mass. DPU (January 1993 to October 1995). During my term as Chairman of the Mass. DPU, the DPU investigated and approved a price cap incentive regulation plan for NYNEX and also undertook a proceeding to examine interconnection and other issues related to the development of competition at all levels of telecommunications, including basic local service.

While I was Chairman, the Mass. DPU issued a series of orders aimed at the reform of electric rate regulation, including revisions to integrated resource management procedures, the introduction of incentive regulation, the treatment of acquisition premiums in mergers and acquisitions, and the design of electric industry restructuring. I was very heavily involved in developing Massachusetts' plan to introduce competition in retail electric markets in that state and the concurrent efforts to establish practical policies to address stranded costs and other transitional issues that arise in restructuring the electric utility industry. While in Massachusetts, I co-chaired the Governor's task force on electricity competition.

While a regulator, I was active in the National Association of Regulatory Utility Commissioners (NARUC), serving on its Communications and Executive Committees. In 1992, I served as President of NARUC. I was also Chairman of the BellCore Advisory Committee and the New England Governor's Conference Power Planning Committee.

Q. What are the primary purposes of your testimony?

A. My testimony has two main purposes. The first is to explain the economically correct principles for estimating the forward-looking, long-run incremental costs that will be incurred by incumbent local exchange carriers (ILECs) as they provide unbundled network elements (UNEs) to competitive local exchange carriers (CLECs).[1] I also explain how those principles should be applied in the context of the Commission's TELRIC concept in the manner most consistent with the stated goals of the Telecommunications Act of 1996 ("the Act") — *i.e.*, delivering the benefits of competition to customers and fostering investment in new facilities and technologies through reliance on competitive processes.[2]

The second purpose of my testimony is to assess whether the methods employed by Verizon Virginia Inc. ("Verizon VA") to estimate recurring and non-recurring costs for UNEs are consistent with the most economically appropriate interpretation of TELRIC.

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[1] For purposes of this testimony, I take as a given the FCC's determination that prices should be set based on forward-looking costs and do not address whether or how unrecovered historical investments should be recovered.

[2] By referring to the "TELRIC concept," I take note of the fact that the FCC's descriptions of TELRIC set out "guidelines," as opposed to a detailed methodology, for state commissions to assess costs on which to base UNE rates. As with other cost of service concepts upon which rates are to be based, there has been substantial disagreement about the application of TELRIC. I believe, however, that TELRIC should be applied to promote economic efficiency and greater competition by basing UNE rates on the forward-looking costs that an ILEC expects to incur to provide UNEs in an efficient way.

Q. What are your principal conclusions?

A. My principal conclusions are that:

- To provide entrants and incumbents alike with the appropriate incentives to invest in telecommunications facilities, and thereby help achieve the Act's goal of encouraging the development of competition, UNEs should be priced to the greatest extent possible in accordance with basic principles of economic efficiency given the constraints of TELRIC.
- Those principles require that costs be determined by using a realistic and practical forward-looking approach that reflects how the ILEC, acting efficiently, expects to deploy its network over time in an uncertain environment.
- Because Verizon VA has now been operating under price caps in both the state and federal jurisdictions for a number of years, it is reasonable to assume that its investment and operating decisions, being driven by profit incentives, have been, at least *ex ante,* efficient. Since this regulatory structure is likely to remain in place, and because Verizon VA already faces steadily increasing competition, its incentives to make the most efficient decisions possible can be expected to continue.
- Verizon VA's UNE and interconnection cost study methods comply with the most economically appropriate interpretation of TELRIC. In particular, the study methods reflect the efficiencies that Verizon VA can be expected to attain using currently available technologies and are designed to estimate long-run forward-looking (rather than historical) costs.

Q. How has Verizon VA implemented TELRIC principles in its cost studies?

A. As I describe below, Verizon VA's recurring cost studies assume — for purposes of making a tractable calculation of TELRIC — a mix of technology that the company would have in place if it were to deploy throughout its entire network the forward-looking mix of currently available technology that it believes to be most efficient. At the same time, to better reflect attainable long-run efficiencies, Verizon VA estimates the costs that it believes it would incur to deploy and operate this forward-looking mix of technology incrementally over time. For example, although the switches assumed in Verizon VA's study reflect the latest available switching equipment that Verizon VA expects to deploy, Verizon VA does not attempt to estimate the cost of an instantaneous, one-time replacement of all of the switches in its network. Rather, Verizon VA's recurring cost study method is designed to capture the costs of *incrementally* deploying throughout its network the mix of switching technology that Verizon VA expects to deploy over the study period. This approach is completely forward-looking — *e.g.*, it assumes that the current most efficient plant is deployed throughout its network — yet it reflects a long-run and realistic approach to the deployment of that plant. It thus complies with the most economically appropriate way to implement the FCC's TELRIC concept.

Q. Please explain why you say that Verizon VA's cost study methods comply with the most economically appropriate application of TELRIC.

A. Having reviewed the study methods used by Verizon VA, I conclude that Verizon VA's studies comply with the essential economic principles embodied by TELRIC. That is, the Verizon VA study methods:

- are based on forward-looking, long-run incremental cost principles;
- are not based on embedded network designs or technologies;
- use inputs based on forward-looking assumptions regarding the network mix and operational methods that Verizon VA could achieve using the most efficient currently available technologies; and
- are consistent with the goals of the Act to benefit consumers, promote efficient competition (given the requirements of the Act), and encourage innovation and the development of new technology.

Thus, prices set based on the Verizon VA study methods would be based on the most economically correct interpretation of TELRIC principles.

Q. How is the rest of your testimony organized?

A. In section II, I set out the economic principles that should be applied to develop costs and prices for UNEs. In section III, I describe why Verizon VA's study methods are consistent with these economic principles given the TELRIC framework, and in section IV, I explain that Verizon VA's study approach is consistent with TELRIC interpreted in light of basic economic principles.

II. ECONOMIC PRINCIPLES AND THE GOALS OF THE 1996 ACT REQUIRE THE USE OF A REALISTIC MEASURE OF EXPECTED COSTS. (JDPL Issues II-1-a to II-1-c; II-2-a to II-2-c)

A. TO PROMOTE ECONOMICALLY EFFICIENT INVESTMENT, WHOLESALE PRICES, SUCH AS PRICES FOR UNES, MUST BE BASED ON THE INCUMBENT'S REALISTIC FORWARD-LOOKING COSTS.

Q. Why should UNE rates be based on the incumbent's costs?

A. UNE prices will promote efficient use of the network and foster innovation and efficient competitive entry only if they are based on all the economic costs that will in fact be incurred by the firm that is required to provide UNEs. Economic costs are forward-looking. In principle, forward-looking UNE prices should reflect *all* the incumbent's economic costs, including shared and common fixed costs.

The Commission has recognized that to send the correct signals to potential entrants about whether to build or buy facilities, prices must be based on the relative economic costs of the network that would actually be used to provide the service: "New entrants should make their decisions whether to purchase unbundled elements or to build their own facilities based on the relative economic costs of these options."[3] Failure to set UNE prices based on an accurate projection of the economic costs that the incumbent will incur would send misleading price signals to the entrant.

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[3] *Implementation of the Local Competition Provisions in the Telecommunications Act of 1996*, First Report and Order, 11 FCC Rcd 15499, 15813 ¶ 620 (1996) (*"Local Competition Order"*).

Q. What effect would setting UNE prices below the incumbent's expected economic costs have on the development of competition?

A. UNE prices set below the forward-looking costs that the incumbent is expected to incur would inefficiently discourage facilities-based competition, thereby undermining one of Congress' primary goals for the 1996 Act. Below-cost UNE prices would lead new entrants to purchase wholesale services from the incumbent even in cases where deploying or expanding their own networks would be the more efficient option from society's perspective.

In addition to discouraging new entrants from investing in facilities, setting UNE prices below the incumbent's expected forward-looking costs would discourage investment by incumbents. Because an incumbent would not be fully compensated for the facilities it would be making available to competitors, it would have a significantly reduced incentive to invest and innovate. Artificially discouraging facilities-based entry by providing an under-priced ride on the ILEC's network would achieve only the illusion of competition — not the benefits of real competition.

Q. Would consumers benefit if the Commission attempted to short circuit market processes by setting rates below the incumbent's expected forward-looking costs in order to "spur" competition?

A. No. In fact, setting prices in this manner would harm consumers. In this scenario, an entrant that could provide its own facilities, and do so at a lower cost to society than the incumbent, could find it more profitable to buy under-priced UNE facilities from the incumbent. As a result, lower-cost, more efficient facilities would be less likely to be

built, and consumers would be denied the benefits of facilities-based competition and the gains that accrue as competitors vie through innovation and new service offerings to lower their costs and enhance their networks to develop new services. Society would be using more resources and incurring a higher overall cost for providing the service than would be the case if UNE prices were set at the incumbent's forward-looking costs.

B. FORWARD-LOOKING COST STUDIES SHOULD BE BASED ON THE INCUMBENT'S EFFICIENT EXPECTED NETWORK DESIGN AND OPERATION.

1. Efficient firms minimize costs in the context of a dynamic, uncertain world as they deploy network facilities over time.

Q. How do firms minimize long-run costs when technology continually evolves and new types of facilities become available?

A. Firms minimize costs over the long run by making incremental and gradual decisions regarding growth and replacement, taking appropriate account of their existing facilities. They do *not* fully supplant their existing operating plant each time a new technology becomes available.

Consider computer systems and software. Firms do not completely replace computer platforms as soon as the next generation of chip or software becomes available. Computers with 486 chips continued to be manufactured and purchased by customers for some time after newer Pentium-based computers first emerged. Further, many companies found it efficient to continue to use older computers for some time even after the platform has been phased out by manufacturers. Similarly, one generation of software usually is not phased out as soon as the next generation is deployed. If an organization has installed the software version on many machines in its network, it may

wait to upgrade (or even skip an entire generation) until the benefits of replacing the existing software are large enough to outweigh the costs — both the direct costs and the indirect costs — of phasing in the new software.

2. Cost models should reflect how networks evolve over time.

Q. What are the implications of real-world network deployment and evolution for cost modeling?

A. The most efficient, lowest-cost growth path for a network firm with existing capacity will be influenced by the totality of its existing facilities. Cost models should reflect the full range of options to an existing firm that is planning for the future. Further, cost calculations must take account of how firms minimize costs given network synergies and the interrelatedness of cost-minimizing incremental decisions. Failing to do so could understate (or overstate) incremental costs. Thus, while it might appear efficient to install a technology that lowers cost for a particular part of a network standing alone, doing so might not be least-cost for the network as a whole if it would require premature replacement of other network components. For example, it may be inefficient to install the latest generation of digital loop carrier equipment to supply loops because doing so would raise the total cost of providing loops and switching functions. In this case, a model that simply assumed full use of the latest DLC technology — without using much faster depreciation rates than are used in reality — would understate costs.

Q. Is a costing approach that takes account of existing facilities consistent with minimizing costs in the long run?

A. Yes. Although the hypothetical long-run concept means that all costs are ultimately variable, it does not mean that all inputs will be instantaneously subject to change or replacement. Replacement and change unfold gradually over time as economic decision-making dictates. Indeed, it is simply unreasonable to assume that a firm will ever reach a long-run steady-state in which it fully supplants its entire network with *today's* newest technology. In an uncertain world, in which the state of technology and demand and supply conditions are changing over time, firms minimize costs in the long run by making incremental decisions regarding network investment. Therefore an efficient firm is likely to employ a number of technologies of differing vintages and characteristics throughout time.

For example, suppose a new firm enters the software business and buys a mixture of new and used computers and related facilities to build a local area network. In this scenario, the initial investment is the cost of the computers and related facilities and the operating costs for the network (excluding the overhead costs for the company office) will include the costs for power, maintenance and depreciation, and the cost of money to purchase the computers and related facilities. Over time, as the maintenance and repair costs of the older computers increase and/or their capabilities and functions are exceeded by newer computers, the software company will replace the older computers with new ones. This will be a gradual process — it would clearly be inefficient simply to replace computers all at once every time a new model came out with lower costs than the original forward-looking costs of the older computers. Similarly, people do not replace their

home computers every time new technology appears for the same reasons — it is simply not in keeping with a reasonable budget plan.

Q. Are there any other reasons that it would not be appropriate to model costs as though firms immediately discard network components in favor of new components?

A. Yes. First, telecommunications firms do not move to each new currently available technology as rapidly as possible because the industry is characterized by innovation, and there is always the realistic possibility (if not probability) that new, even more efficient plant — *i.e.*, plant with lower costs and/or added functionality — will be available in the relatively near future. As a result, too quick a commitment to replacement may mean that the firm will have to forego an even better technology that is coming along. This is one reason that firms do not usually replace their entire network *at one time* with new technology.[4] Using the software company example, the firm might replace some of its

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[4] According to Professor Kahn:

> In a world of continuous technological progress, it would be irrational for firms constantly to update their facilities in order *completely* to incorporate today's lowest-cost technology, as though starting from scratch, the moment those costs fell below prevailing market prices. Investments made today, totally embodying the most modern technology available currently, would instantaneously be outdated tomorrow and, in consequence, fail over their lifetime to earn a return sufficient to justify the investments in the first place. For this reason, as Professor William J. Fellner pointed out many years ago, firms even in competitive industries would systematically practice what he termed "anticipatory retardation." In other words, they would adopt the most modern technology only when the progressively declining real costs had fallen sufficiently below currently prevailing prices to offer them a reasonable expectation of earning a return on those investments over their economic lives.

computers when the next generation of processors is released, but it may very well not replace *all* its computers, because even newer, lower-cost computers may be developed. As Dr. Vander Weide explains in his testimony, this risk that newer and better technologies will develop is one reason that a cost model that took the instantaneous and continuous replacement approach would require the use of substantially higher depreciation and capital costs than a model that assumes the network is deployed in a more realistic fashion.[5]

Second, the newest technology for one aspect of a network might not be fully compatible with the existing plant. Thus, if a new transmission technology is available but requires the newest switching module to be deployed efficiently, a firm might incur higher total network costs if it were to deploy that new transmission technology because doing so would require replacing the complementary switch module. Returning again to the software company, if a new, more efficient operating system is developed, the company might decide not to upgrade to the new system because it would also require increasing the amount of memory and processor speed in each computer, and the total costs of making such changes would override the benefits of the newer operating system.

Alfred E. Kahn, *Letting Go: Deregulating the Process of Deregulation* 91-92 (1998) (footnotes omitted).

[5] *See* Testimony of Dr. James Vander Weide at 5, 10, 31-32.

Q. By suggesting that firms should take account of their existing facilities, are you supporting an embedded cost methodology?

A. No, I am speaking solely to the correct economic principles for use in a forward-looking cost model. Firms necessarily compare the expected net present value of the costs of continuing to use some or all of the their current facilities with the expected net present value of the costs of deploying and operating new equipment. Considering the full range of options available to a firm is neither a "backward looking" nor an embedded cost methodology. It is quite the reverse. The use of existing plant will still generate depreciation costs and interest costs going forward. Depreciation costs are incurred because the existing plant will lose value over time; and interest costs are incurred because, by continuing to operate the plant, the firm foregoes the ability to sell the plant and use the money for an alternative investment.

3. Long-run, forward-looking studies should reflect how the ILEC expects to operate.

Q. Please explain how a cost model can estimate realistic forward-looking costs that reflect how the ILEC expects to operate.

A. Cost models should reflect — to the extent consistent with available data — how firms minimize their costs. Thus, *if the data were available*, it would be appropriate to model the network and costs to fully reflect the evolving nature of the network as it moves from the current mix of technologies to the anticipated mix. Unfortunately, developing such a model — *i.e.*, one that literally captured the evolving mix of network technologies — would require extremely complex algorithms and a very detailed data set regarding the costs of the potential options at each point in time.

In the absence of complete data (and in conformity with the Commission's rules), three basic guidelines can be used to estimate long-run forward-looking costs: (1) assume that the network reflects the mix of network components that the firm believes to be most efficient to deploy (and therefore reasonably expects to deploy) in new and replacement installations during the study period; (2) estimate operating, maintenance, and capital costs the firm would incur to efficiently deploy and operate this forward-looking network mix; and (3) use inputs such as fill factors, cable size, and equipment prices that reflect the ILEC's expectations about the efficiencies that it could reasonably achieve in deploying and operating this forward-looking network.

These guidelines are completely forward-looking. Applying them produces the forward-looking costs of the technology currently being deployed in the network, while allowing the analysis to more closely approximate the efficient long-run expected economic costs of deploying and operating the ILEC's network over time.

Q. Is it appropriate to base forward-looking operating costs on a company's expected practices and costs (including appropriate adjustments for expected efficiencies)?

A. Yes. Because Verizon VA has been operating under price caps, it has had strong incentives to minimize costs, and there is reason to believe that the current network has been and is being deployed and operated efficiently. As a result, data based on current network investment and operating practices provide the most appropriate (and in many cases, the only sound) bases for the analysis. Such an approach does not amount to an embedded cost methodology, provided that the study adjusts for anticipated changes in costs.

Moreover, basing the study on recent experience — adjusted to reflect expected changes in technology, input costs, and production methods — is a reasonable way to account for the complexities of Verizon VA's network deployment and actual operation. Doing so grounds the study in reality, yet allows analysts to capture attainable long-run, forward-looking costs of an efficient firm. For example, conducting engineering surveys of outside plant characteristics, such as average loop length, allows the analysis to capture implicitly the effects of: (1) natural characteristics — such as bodies of water, hills, and surface type; (2) man-made characteristics — such as roads, buildings, and major facilities like airports; and (3) governmental requirements — such as zoning restrictions. All of these factors are of course reflected in the current network, and, as long as the cost study includes adjustments to reflect expected changes in network design, the study will be forward-looking.

Q. Why is it appropriate to base cost models on how the ILEC's network is expected to evolve?

A. This aspect of the process is crucial to capture realistically attainable efficiencies — as opposed to hypothetical but unattainable savings. Verizon VA's network will continue to evolve in a dynamic, uncertain world. For example, demand for loops may or may not materialize where and when the demand is forecast to develop when investment decisions are initially made. Customers may move into an area in greater numbers than forecast or they may not show up or they may use more or fewer loops per customer than expected.

The ILEC's experience and planning guidelines are most likely to capture the cost implications of coping with this and numerous other realities. As a result, Verizon VA's

experience — embodied in its network characteristics and expectations about how those characteristics can be adapted to reflect future technologies — is most apt to capture the costs that will be incurred in the future. By contrast, complete replacement cost models based on assumptions of what "an efficient" but hypothetical firm could do starting from scratch have almost no chance of capturing these complexities.

III. VERIZON VA'S STUDY METHODS MEASURE FORWARD-LOOKING, LONG-RUN INCREMENTAL COSTS. (JDPL Issues II-1-a to II-1-c; II-2-a to II-2-c)

Q. Overall, are Verizon VA's cost studies consistent with the guidelines for measuring forward-looking costs that you described in the previous section?

A. Verizon VA's approach takes into account its current, forward-looking network design and attainable efficiencies in accordance with the guidelines I outlined above. In order to make the analysis tractable, Verizon VA assumes that the *entire network* is replaced with the technology currently being used in new plant construction. In reality, such a complete replacement would not occur and certainly not instantaneously; thus, to better reflect the costs that Verizon VA really can efficiently achieve, the study method uses assumptions regarding network characteristics and input costs that reflect Verizon VA's estimates of the costs it would realistically experience if it were to deploy the current least cost technology throughout its network over time. This is the most reasonable application of long-run, forward-looking cost principles given the constraints of the FCC's TELRIC concept.

Q. Are there any reasons to believe that Verizon VA's approach might understate its long-run UNE costs?

A. Yes. As explained in greater detail in Dr. Shelanski's testimony, a complete replacement cost approach — especially one that assumes the network can be replaced instantaneously — may require higher depreciation rates than those used by Verizon VA in its study; thus, by assuming complete replacement of its network without simultaneously accounting for the increased depreciation costs that would likely result, Verizon VA's cost model likely understates costs.[6] Similarly, by using a cost of capital appropriate for competitive firms that are not forced to sell their production facilities to their competitors under terms and conditions such as those required by the *Local Competition Order,* Verizon VA is likely understating its capital costs for UNEs. And, as explained in more detail above,[7] by using a future mix of technologies without accounting fully for the fact that it would impose extra costs on the firm to actually deploy those technologies in advance of the time they would be deployed during the natural evolution of the network, the model is likely to understate costs.

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6 *See* Testimony of Dr. Howard Shelanski at 13-15, 27-28.

7 *See* pages 9-14.

A. VERIZON VA'S RECURRING COST MODEL ASSUMES A FORWARD-LOOKING MIX OF PLANT BASED ON WHAT IS BEING DEPLOYED IN THE NETWORK.

Q. What are some of the steps Verizon VA has taken to ensure that the model uses a forward-looking, long-run plant mix?

A. Verizon VA, rather than assuming its existing technology mix, generally estimated the technology mix that will be deployed on a going forward basis where it builds new facilities or replaces existing ones. Verizon VA, based on company planning guidelines and expected deployments, determined what mix of technologies it would deploy in these situations taking account of technology and other trends that it expects to emerge over a three-year study period. Then, it developed costs under the assumption that this mix is deployed network-wide (even though generally that will not in fact be the case by the end of the study period).

For example, to estimate loop costs Verizon VA cost experts and engineers used a modeling approach to estimate the most efficient forward-looking mix of plant. That is, Verizon VA used its loop cost model to do a sensitivity analysis to determine how distance affects the costs of using end-to-end copper loops rather than using fiber/DLC feeder plant combined with copper distribution plant. Based on this analysis, it identified the loop length at which it was most efficient to use each of these options. The resulting mix of loops in the recurring cost model is composed of fiber and copper in proportions that differ substantially from the embedded plant. In particular, the ratio of fiber to

copper used by Verizon VA in the cost model is much higher than in the current plant or even in the plant that will be in place by the end of the study period.[8]

Having determined the appropriate technology mix, Verizon VA then based its input cost for the new equipment on the cost that it expects to pay going forward. For example, Verizon VA estimated switching equipment costs based on discounts that reflect the expected mix of purchases over the study period.

Q. Does Verizon VA's study properly factor in expected changes in operating costs?

A. Yes. Verizon VA's analysis accounts for company-specific expectations regarding productivity growth, improvements in efficiency, reductions in cost, and changes in the plant mix going forward. The costs are based on the firm's recent experience with particular plant types using currently available technologies — *e.g.*, fiber cable — adjusted to reflect forward-looking expected changes.

Q. Does Verizon VA's use of a three-year study period appropriately implement the requirement that costs be measured in terms of the "long run"?

A. Yes. A practical long-run analysis of technologies and practices should be based on a realistic study period. Technological uncertainties in a dynamic industry like telecommunications mean that analysts simply cannot forecast with sufficient precision to base cost estimates (and pricing decisions) on a planning construct beyond two or three years. In fact, the Commission has explicitly stated that TELRIC estimates should be

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[8] *See* Verizon VA Cost Panel Testimony § V.C.

based on technology currently being deployed in the network.[9] Thus, it was entirely reasonable to determine the appropriate "long-run" technology mix based on the mix that Verizon VA expects to deploy over the next three years.

Furthermore, Verizon VA's recurring cost model assumes that the technologies it expects to deploy over the study period have been fully deployed throughout the network, even though they will be in place only in parts of the network by the end of the study period. VA sought to approximate what it would cost it to deploy and operate this mix of technology to the extent consistent with this replacement cost approach. Doing so is clearly a long-run approach.

B. VERIZON VA'S APPROACH TO INPUT COST ASSUMPTIONS IS FORWARD-LOOKING.

Q. Based on your review of Verizon VA's study methods, are the input cost assumptions used in the study appropriately forward-looking?

A. Yes. Verizon VA's approach uses inputs that reflect the most efficient forward-looking technology deployment and operations based on its experience, planning guidelines, and judgment about future network deployment. In the remainder of this subsection, I give some examples of why I have reached this conclusion.

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[9] *See, e.g., Local Competition Order* at 15848-49 ¶ 685; 47 C.F.R. § 51.505(b)(1).

1. Verizon VA's switching cost input assumptions comport with forward-looking, long-run incremental cost principles.

Q. Is Verizon VA's approach to switching cost estimates based on forward-looking assumptions about the costs to install and operate switches?

A. Yes. As described in Verizon VA's Cost Panel Testimony, Verizon VA first determined the expected forward-looking mix of digital switch types — *e.g.*, Lucent 5ESS and Nortel DMS — and the forward-looking configurations for each switch type.[10] The testimony also explains that the mix of equipment used in the study represents the latest available equipment that Verizon VA is actually deploying and expects to deploy, not the mixture of equipment currently deployed in its network.[11] Then, Verizon VA applied switch vendor pricing assumptions developed to reflect the expected prices for this forward-looking switching equipment.[12] Following this approach ensures that switching equipment costs are based on prices and discounts that reflect the expected mix of purchases over the study period and represent the costs that Verizon VA expects to incur for switching equipment on a forward-looking basis.

Q. Is it reasonable to assume that switching costs will reflect the discounts assumed by Verizon VA?

A. Yes. If — as is the case — Verizon VA expects to continue to use the same types of digital switches and make the same types of switching investments that it makes today,

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[10] *See* Verizon VA Cost Panel Testimony § 6.

[11] *See id.*

[12] *See id.*

then its approach is a reasonable way to estimate the switch prices it will pay in the future. As explained in the Verizon VA Cost Panel Testimony, Verizon VA has been and expects to continue upgrading and expanding its switching network by purchasing a mixture of switching equipment incrementally.[13] Thus, calculating the discount for a mix of components and peripherals based on its recent experience is a very reasonable approach.

2. Verizon VA's cable cost input assumptions comport with forward-looking, long-run incremental cost principles.

Q. Does Verizon VA use forward-looking assumptions in estimating cable costs?

A. Yes. As described above and in the Verizon VA Cost Panel Testimony, cable investment costs are based on the proportion of copper and fiber cables that Verizon VA calculated would be most cost-efficient on a going-forward basis.[14] As a result, the percentage of fiber assumed in the study is significantly higher than what is currently deployed in its network or even what will be deployed by the end of the study period.

Q. Has Verizon VA performed a sensitivity analysis that compares the costs of the mix of loop plant assumed in its study with the mix that it expects will be in place at the end of the study period?

A. Yes. Verizon VA conducted a sensitivity test to estimate the costs of using the mix of loop plant that it believes will be in place at the end of the study period as compared to

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[13] *See id.*

[14] *See id.* § V.C.

the estimated costs based on the mix of new plant that was assumed for purposes of the study. Note that even the mix of plant used in this sensitivity test is forward-looking because it represents greater use of new technologies at the end of the planning period — *e.g.*, fiber and carrier systems to provide local services — than is in place in the current network. The results of this estimate show that the engineering costs for a 2-wire analog loop would be approximately 14% higher if the studies were based on the actual technology mix that will exist at the end of the study period instead of only the technology mix of new builds during the study period.

Q. Is it reasonable to use actual fill factors as a basis for forward-looking costs?

A. Yes. Actual fill factors are appropriate if they reflect expected, attainable future fill levels. Such factors are likely to be efficient as well as realistic because they emerged under a regulatory regime — *i.e.*, price cap regulation, rather than rate of return regulation — in which Verizon VA has had strong incentive to minimize costs subject to the obligation to serve.[15] Fill factors of well less than 100 percent will be economically efficient even in long-run equilibrium (which is not to say the local telephone service market would ever get there) wherever there are strong economies of scale. The object of the firm is to minimize the cost of providing a given level of telecommunications services, not to minimize the unit cost of cable. Verizon VA has determined appropriate and efficient fill factors based on its experience and engineering judgment, and there is

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[15] *See generally Policy and Rules Concerning Rates for Dominant Carriers*, Second Report and Order, 5 FCC Rcd. 6786 (1990).

no reason to assume that those efficient fill factors will change over the study period given currently available technology.

Moreover, the fact that Verizon VA's model assumes fill factors well under 100% is not any indication of assumed inefficiency or that the study is not forward-looking. Rather there are a number of specific reasons why fill factors will be less than 100% in an efficient, real-world network. For example, distribution fill factors reflect, among other things, the need to build plant in advance to minimize costs and the fact that demand patterns cannot be forecast with precision. Verizon VA has no way of knowing whether a particular residence will use one, two, or even more phone lines. It would not be efficient for Verizon VA simply to install one distribution cable and then dig trenches to install additional distribution plant if it turned out the owners of the residence wanted two or more lines. As a result, Verizon VA or any other efficient carrier will install sufficient distribution plant to meet potential demand for each anticipated customer premise (based on its experience and engineering judgment). But that necessarily means that an efficient carrier's distribution plant will not be filled to capacity (or near capacity) because, for example, some premises owners will decide to use only a single line.

3. The cost of capital and depreciation used by Verizon VA comport with forward-looking, long-run incremental cost principles.

Q. What factors should be considered in establishing the appropriate cost of capital and depreciation for forward-looking cost studies?

A. The cost of capital must reflect prospective marketplace realities and uncertainties associated with the introduction of competition. With the advent of competition, current market conditions are no longer compatible with historical regulatory depreciation rates.

Q. Is Verizon VA's approach to estimating the cost of forward-looking capital appropriately forward-looking?

A. Yes. Dr. Vander Weide appropriately estimates the cost of capital based on a set of firms that have risks associated with competitive markets.[16] Doing so is clearly consistent with taking a forward-looking view of the increasingly competitive telecommunications markets in which Verizon VA operates and with the Commission's goal of estimating costs based on a competitive market standard. Moreover, it would make no sense to assume technologies that are forward-looking, on the grounds that competition drives firms to replace their networks or price their services at replacement costs, without also assuming that capital costs reflect this same assumption of competition.

Furthermore, ILECs have to make network elements available to their competitors at a regulatory determined "economic cost," while the ILECs' competitors can pick and choose between using their own network elements or the ILECs' and do not have to commit to long term contracts. This fact both raises the ILECs' risks above normal competitive levels and shortens depreciation lives compared to those faced by other firms in competitive markets who do not have to make available their production capacity to their competitors. This is particularly true in an environment where the ILEC is subject to successive proceedings every few years in which prices are reset using a replacement cost model that again assumes that the then-current network is completely rebuilt, stranding part of what today are forward-looking investments. Thus, as I noted earlier

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16 *See* Testimony of Dr. James Vander Weide at 44-48.

and as Dr. Shelanski explains at greater length, Dr. Vander Weide's recommended cost of capital for UNEs likely understates Verizon VA's costs.

Q. Is Verizon VA's approach to depreciation correct as well?

A. Yes. To conduct a long-run, forward-looking study, depreciation rates must reflect marketplace realities and/or emulate competitive outcomes in which firms must depreciate their plant rapidly enough to reflect rapid deployment of up-to-date technologies. As explained in Dr. Lacey's testimony, Verizon VA appropriately uses GAAP lives that reflect actual depreciation rates Verizon reports to investors.[17]

Q. What harms would result if the Commission were to require costs of capital and depreciation lives that were not consistent with the competitive markets it seeks to promote?

A. Failing to allow returns commensurate with the risks in a competitive market would substantially undermine the fundamental profit incentives and processes by which competitive markets encourage firms to invest in new plant in order to reduce costs and introduce more desirable products. No incumbent firm will risk investment dollars to modernize if it cannot even cover its expected cost of capital. Similarly, in an ironic symmetry, a competitor will not risk its own investment dollars if it can lease the incumbent's plant at rates that do not reflect all of the costs incurred by the incumbent. Finally, it is important to note that, as Dr. Shelanski explains, the cost of capital and

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[17] *See* Testimony of Dr. John Lacey at 4-16.

depreciation costs would increase beyond those consistent with a competitive market if a regulator were to assume the total and instantaneous replacement of Verizon VA's entire network.[18]

C. VERIZON VA'S NON-RECURRING COST MODELS ARE BASED ON AN APPROPRIATE FORWARD-LOOKING METHODOLOGY.

Q. Is the method Verizon VA used to estimate non-recurring costs consistent with economic principles and appropriately forward-looking?

A. Yes. Based on my review of the Verizon VA Cost Panel Testimony, I conclude that Verizon VA's approach is appropriate to estimate forward-looking non-recurring costs for service order processing and provisioning associated with UNEs. The testimony explains that the non-recurring cost study methodology: (i) takes into account reasonably achievable efficiencies associated with non-recurring activities; (ii) is based on the forward-looking network infrastructure, operating methods, and systems expected to be in place at the end of the study period; (iii) includes only the specific work activities required to process and provision CLEC orders in that operating environment; and (iv) reflects expected savings due to improved systems and operations methods, and the effects of the learning curve.[19] Operationally, Verizon VA determined (i) the time it currently takes to perform each work activity needed to fulfill a CLEC service order; (ii) the probability that each work activity is actually performed to fulfill a CLEC service

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[18] *See* Testimony of Dr. Howard Shelanski at 13-15.

[19] Verizon VA Cost Panel Testimony § XII.

order; and (iii) critically, then adjusted these figures downward to account for expected technological developments, process changes, and any other efficiency gains that would either reduce the time to do a task or lower the frequency with which it has to be performed by the end of the study period.[20] The resulting forward-looking estimates are then multiplied by the appropriate projected levelized labor rate and marked up by common cost and gross revenue loading factors (intended to recoup regulatory fees and uncollectables associated with non-recurring revenue) to determine the price of each non-recurring service.[21]

Q. Verizon VA's non-recurring cost methodology is based on the network infrastructure, operating methods, and systems that will be in place by the end of the study period. Does this mean it is not forward-looking?

A. No. The measure of forward-looking non-recurring costs should capture the costs that the relevant firm — *i.e.*, in this case, Verizon VA — acting efficiently would incur to take and fill orders from CLECs who wish to purchase loops, switching, and transport elements that will be in place *over the study period.* These costs include the costs of taking the orders using the systems that Verizon VA expects will be in place, and hooking up its loops to the CLECs' facilities during the study period. Thus, Verizon VA's non-recurring cost study methodology is designed to measure Verizon VA's expected future forward-looking costs to perform these non-recurring functions. (Indeed,

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[20] *See id.*

[21] *See id.*

Verizon VA's non-recurring cost study is even more forward-looking than called for by economic principles and will understate non-recurring costs, because Verizon VA assumes that the costs of these activities will reflect the efficiencies that it can attain by the *end* of the study period — rather than using an average of the forward-looking costs *over* the study period.)

Q. Is Verizon VA's non-recurring cost study still forward-looking even though it does not assume the same technology mix as in the recurring cost study?

A. Yes. Recurring and non-recurring cost studies measure different types of forward-looking economic costs. For recurring costs, Verizon VA's models are designed to measure the forward-looking incremental costs Verizon VA expects to incur when it deploys incremental capacity using the currently most efficient technology mix. Older mixes of technology are not used in this calculation of incremental cost, because those technologies are not used to supply incremental facilities. However, as explained above, Verizon VA's recurring cost study does not reflect the mix of technologies that will be in place at the end of the study period; the forward-looking network that Verizon VA will have in place at the end of the study period will certainly contain a mixture of old and new vintages of technology.

For non-recurring costs, Verizon VA will incur labor and other costs required to fulfill CLEC orders based on the network infrastructure, systems, and processes that are utilized during the study period. This network contains both old and new technologies, and the forward-looking economic non-recurring costs Verizon VA will incur are those of fulfilling orders in this network. Charging competitors the actual costs they impose

when they demand such non-recurring services promotes efficient entry and expansion decisions.

The fact that Verizon VA calculates its recurring costs by assuming that it has fully replaced its plant mix across its entire network infrastructure is a simplifying assumption that facilitates the modeling process. Even though the recurring cost model assumes a different mix of plant than will be used over, or by the end of, the study period, that simplification in no way implies that the non-recurring cost study methodology should do the same. It makes no sense to assume that carriers who purchase UNEs during the study period will connect to future plant that will not even be in place by the end of the study period rather than connect to some older vintages of plant that will be in place. Thus, it is appropriate to determine the costs that competitors will cause by using UNEs that are provided using the plant mix and procedures that Verizon VA will have in place at the end of the study period.

IV. VERIZON VA'S STUDY METHOD REFLECTS THE MOST ECONOMICALLY CORRECT IMPLEMENTATION OF THE FCC'S TELRIC CONCEPT. (JDPL ISSUES II-1-A TO II-1-C; II-2-A TO II-2-C)

Q. What aspect of the TELRIC rules sets out the primary concepts on which UNE prices are to be based?

A. The relevant portion of the Commission's TELRIC rules requires that when a firm determines the costs on which UNE prices will be based,

> [the TELRIC] of an element should be measured based on the use of the most efficient telecommunications technology *currently*

available and the lowest cost network configuration, *given the existing location of the incumbent LEC's wire centers.*[22]

Q. This rule has been interpreted in many ways. How should it be applied so as to benefit consumers and otherwise be consistent with the goals of the Act?

A. It should be applied as much as possible in a manner that is consistent with economic principles and with how real-world firms behave.[23] That is, the reference to "use of the most efficient telecommunications technology currently available and the lowest cost network configuration, given the existing location of the incumbent LEC's wire centers" should be interpreted to account for how an efficient ILEC deploys new technology in reality, given the fact that it has a network already in place.

Q. Are Verizon VA's UNE cost study methods consistent with the most economically correct application of the Commission's TELRIC rules?

A. Yes. Verizon VA's study methods are consistent with these requirements and goals:

- Verizon VA's study methods are completely forward-looking. They assume the use of the latest available technologies currently being deployed in its network and not the current embedded technology mix, taking into account that different vintages of equipment will be used in an efficient network. They also use forward-looking plant costs, equipment quantities, fill factors, labor costs, and other inputs.

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[22] 47 C.F.R. § 51.505(b)(1) (emphasis added).

[23] *See* Section II above.

- Verizon VA's approach factors in how its own network will evolve efficiently over time to reflect the realities of network deployment and operation that Verizon VA itself expects to face in the future.
- The Verizon VA cost studies do *not* use an embedded cost methodology. They do not include retail costs, universal service subsidies, or opportunity costs (*i.e.*, lost revenues that arise as a result of selling UNEs).
- The studies are consistent with the FCC definition of the long run. They use the most efficient technologies currently available and being deployed in the network. Verizon VA's use of a three-year study period is entirely consistent with a long-run approach because the study assumes that the technologies that are most efficient to deploy incrementally, in new and replacement installations during the next three years, are used throughout the *entire* network, even though they would not actually replace the entire network in such a short time period.
- By using assumptions about plant quantities — *e.g.*, cable route lengths, fills, and pair sizes — that can really be achieved based on its expectations about deploying the network over time, Verizon VA's study method is consistent with the goals of promoting competition and network investment by sending the right pricing signals to entrants.

Thus, I conclude that Verizon VA's studies comply with the most economically appropriate interpretation of TELRIC.

Q. Does this conclude your testimony?

A. Yes.

Declaration of Kenneth Gordon

I declare under penalty of perjury that the foregoing is true and correct. Executed this 25th day of July, 2001.

Kenneth Gordon